Simpson

INSTRUMENTS THAT STAY ACCURATE

260 Add-A-Tester Adapter

OPERATOR'S MANUAL

TEMPERATURE TESTER MODEL 652

SIMPSON ELECTRIC COMPANY
5200 W. Kinzie St., Chicago 44, Illinois, ES 9-1121
In Canada, Bach-Simpson, Ltd., London, Ontario

New SIMPSON 260 "Add-A-Tester" Line

TRANSISTOR TESTER, Model 650 . . . . . $26.95
Beta Ranges: 0-10, 0-50, 0-250, (F.S.)
Beta Accuracy: ±3%, with 260 ±5% nominal
Ico Range: 0-100 ua
Ico Accuracy: ±1%, with 260 ±3% (F.S.)

DC VTVM, Model 651 . . . . . $32.95
Voltage Ranges: 0-.5/1.0/2.5/5.0/10/25/50/100/250/500
Accuracy: ±1%, with 260 ±3% (F.S.)
Input Impedance: greater than 10 megs all ranges

TEMPERATURE TESTER, Model 652 . . . $38.95
Temperature Ranges: −50°F to +100°F, +100°F to +250°F
Accuracy: with 260 ±2° (nominal)
Three lead positions provided
Sensing Element: thermistor

AC AMMETER, Model 653 . . . . . $18.95
Ranges: 0-0.25/1/2.5/12.5/25 amps
Accuracy: ±1%, with 260 ±3% nominal
Frequency Range: 50 cycles to 3000 cycles

AUDIO WATTMETER, Model 654 . . . . . $18.95
Load Ranges: 4,8,16,600 ohms
Wattage: Continuous 25 watts (8,600 ohms)
50 watts (4,16 ohms)
Intermittent 50 watts (8,600 ohms)
100 watts (4,16 ohms)
Accuracy: ±5%, with 260 ±10% nominal
Direct reading scale from 17 microwatts to 100 watts

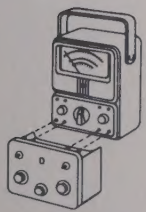
MICROVOLT ATTENUATOR, Model 655 . $18.95
Ranges: 2.5 microvolts to 250,000 microvolts continuously variable in decade steps
Frequency: DC to 20 KC
Accuracy: ±1db

BATTERY TESTER, Model 656 . . . . . $19.95
Checks all radio and hearing aid batteries up to 90 volts at the manufacturer's recommended load, or any external load.

Note: All Simpson 260 Adapters provide for normal 260 usage without disconnecting the adapter.

OPERATOR'S MANUAL

TEMPERATURE TESTER MODEL 652



Just plug it in

SIMPSON ELECTRIC COMPANY

5200 W. Kinzie St., Chicago 44, Illinois, ES 9-1121

In Canada, Bach-Simpson, Ltd., London, Ontario

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1-4M—10-59 Printed in U.S.A.

FIGURE 1 – SIMPSON MODEL 652
TEMPERATURE TESTER

OPERATOR'S MANUAL

SIMPSON TEMPERATURE TESTER MODEL 652

SECTION I

GENERAL DESCRIPTION

INTRODUCTION

The Simpson Temperature Tester Model 652 is a compact self-powered instrument. When it is used in conjunction with a Simpson **260*** or **270** Multimeter, temperatures can be measured through the range of −50° F to +250° F. Three probes may be attached for simultaneous and rapid comparison of temperatures at three different locations.

The Simpson VOM-plus-adapter concept is completely unique in approach and versatility. Each of the adapter models, of which the Temperature Tester is but one example, provides specific measurement and testing capabilities at a fraction of the cost normally required for separate testers.

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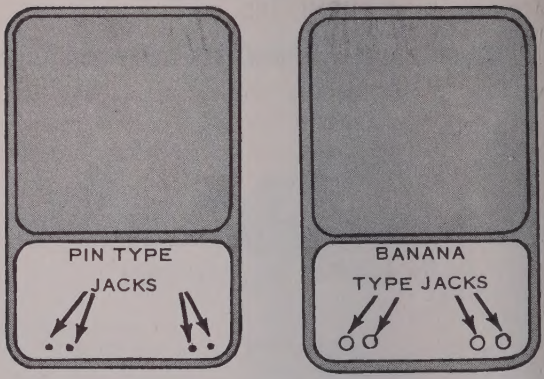
*Trade Mark Registered U. S. Patent Office.



(a) 260, Series II (b) 260, Series III

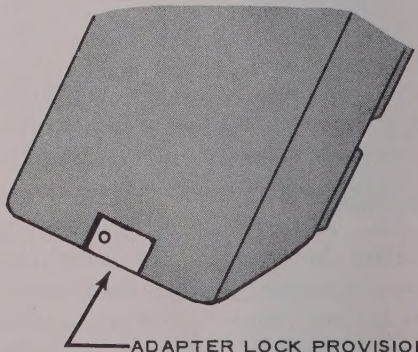


FIGURE 2 – 260* IDENTIFICATION

*Trade Mark Registered U. S. Patent Office

ACCESSORIES FURNISHED

Each adapter is furnished with an Operator's Manual, one thermistor probe with 15-foot lead, and four extra pin-type plugs. The lead connects into a front panel jack and 'samples' the temperatures to be measured. The four pin-type plugs are used only when the Model 652 is to be used with a **260** Series II (see figure 2 for **260** Series II and Series III identification).

ADDITIONAL ACCESSORIES AVAILABLE

Extra thermistor probes may be purchased separately for use with the Model 652. They are available as follows:

Length	Part No.	List Price
15-foot	10-890010	$3.95
30-foot	10-890216	5.55
50-foot	10-890415	6.50
100-foot	10-890416	8.70
150-foot	10-890417	10.95

(Prices subject to change without notice)

SPECIFICATIONS

Ranges - Temperature:

Low: Minus 50° F to plus 100° F.

High: Plus 100° F to plus 250° F.

Accuracy:

−50° F to −30° F: ±4° F (nominal)
−30° F to +90° F: ±2° F (nominal)
+90° F to +100° F: ±4° F (nominal)
+100° F to +220° F: ±2° F (nominal)
+220° F to +250° F: ±4° F (nominal)

Sensing Element:

Thermistor

Number of Leads:

One 15-foot lead supplied; provision for use of three leads.

Power Requirements:

Self powered by one 1.5-volt size D dry cell.

Size: 5-5/16 x 4-3/8 x 3-7/16 inches.

Weight: 1-3/4 lbs.

MODIFICATION KITS

Adapter Case Kit 401 for 260 Series III and 270.

Use of this kit is optional. It modifies the **260** Series III or **270** VOM produced prior to June 1, 1959. It consists of a modified case which permits latching the Model 652 securely to the underside of the multimeter.

Adapter Case Kit 402 for 260 Series II.

This kit is required for conversion of a Simpson **260** Series II to electrically accomodate the Model 652. It includes instructions and parts necessary for the conversion. This conversion provides a 50 microampere D.C. range in the instrument.

CONTROLS AND CONNECTORS

FUNCTION SWITCH

The FUNCTION switch is the control at the left. It has four positions marked OFF, ADJ., LO, and HI. It selects the range for the Temperature Tester and provides for calibration. The battery is disconnected when the switch is set at OFF to prolong battery life when the Model 652 is not being used.

METER ADJUST

This control is at the center of the front panel. When the FUNCTION switch is set at ADJ., the VOM should indicate 25 on its 0–50 DC scale. This control adjusts the meter sensitivity while the switch is in the ADJ. position.

PROBE SEL.

This switch is at the right side of the front panel. It selects the probe input which is being

metered. The switch positions match the probe jacks, which are also numbered 1 – 2 – 3.

260 – 652 SWITCH

This is a convenience switch located just below the center of the front panel. It allows the use of the VOM without detaching the Model 652.

260 DIRECT JACKS

The 260 DIRECT jacks are located at the lower left of the front panel. When the 260 DIRECT – 652 ADAPTER switch is in the 260 DIRECT position, these jacks are connected directly to the **260/270** input jacks marked + and COMMON –.

1 – 2 – 3 JACKS

The jacks marked 1, 2, and 3 at the lower right on the front panel are for connecting temperature test probes. Only one probe is furnished with the adapter, and it may be used in any of the three jacks, with the PROBE SEL. switch set at the matching position. If one or two additional probes are purchased as accessories, they may be connected in the unused jacks and selected with the PROBE SEL. switch as desired.

SLIDE RULE

The slide rule at the top of the panel is used to convert the readings of the **260/270** to temperatures.

SECTION II

OPERATING INSTRUCTIONS

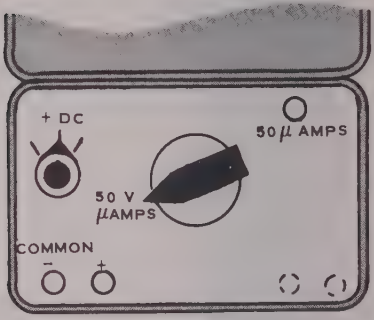
1. Initial Adjustments

a. 260/270 Control Settings.

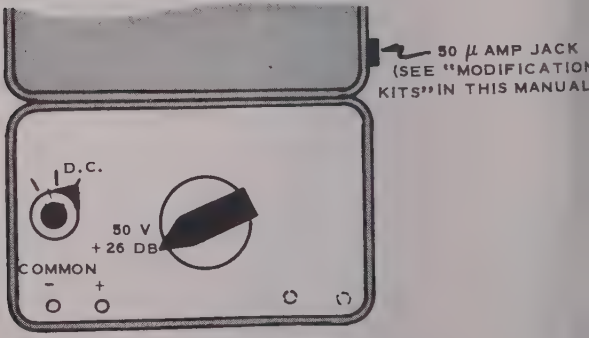
1. With the Model 652 disconnected, check the meter pointer position for zero indication with the VOM in its operating position. If the pointer is off zero, adjust the bakelite screw just under the meter. Refer to the VOM Operator's Manual for this adjustment.

2. Set the **260/270** for + DC operation.

3. Set the **260/270** range switch to the 50V position.



(a) 260 Series III/270 Control Positions and Jack used with Model 652.



(b) Modified 260 Series II Control Positions and Jack used with Model 652.

FIGURE 3 – VOM CONTROL POSITIONS FOR USE WITH MODEL 652

b. Model 652 Control Settings.

1. Set the 260 DIRECT – 652 ADAPTER switch in the 652 ADAPTER position.

2. Set the FUNCTION switch at OFF.

c. Connecting the Model 652 to the VOM.

1. Insert the top four plugs of the Model 652 into the lower four jacks of the **260/270.**

2. Insert the short lead from the Model 652 into the 50μAMP jack.

3. Position the adapter locking latch underneath the instrument to secure the two units.

CAUTION

If your **260/270** does not have the locking provision, avoid applying excessive pressure to the top of the Adapter when it is used in the Adjust-A-Vue position. A modification kit, which includes a new case with an adapter locking provision is recommended for optimum rigidity (see page 4).

4. Turn the FUNCTION switch of the Model 652 to ADJ. The VOM pointer should indicate 25 on the 0–50 DC scale. If it does not, turn the METER ADJUST control on the Model 652 to obtain the correct indication. When the pointer cannot be brought up to 25, the battery in the Model 652 must be replaced.

5. Connect the temperature measuring probe(s) to the jack(s) on the Model 652.

2. Temperature Measurements

a. Set the FUNCTION switch of the Model 652 at LO and the PROBE SEL. at the position which matches the jack into which the active probe is connected. If more than one probe is connected, set this switch for reading each in turn.

b. Allow sufficient time for the probe to attain the temperature of the object being measured. When measuring air temperature, allow several minutes for the temperature to stabilize. When measuring liquids, only a few seconds are required.

WARNING

Do not immerse the probe in acids or in solutions which attack the plastic insulation on the cord or the brass probe shell. Use a suitable protective covering such as a lead or glass tube.

c. Read the 0–50 DC scale on the **260/270.** If the pointer is deflected off the right side of the scale, the temperature is below −50° F. and is outside the measuring limits. If the pointer is deflected off scale to the left, the temperature is above +100° F.; set the FUNCTION switch at HI. If the pointer is deflected off scale to the left in the HI range, the temperature is above +250° F. and cannot be measured with the Model 652; remove the thermistor from the high temperature to prevent damage to it.

d. Read the 0–50 DC scale on the **260/270.**

e. Set the hairline of the slide rule at the reading obtained on the VOM. Use the top scale of the slide rule, marked 0 to 50.

f. Read the temperature under the hairline on the slide rule. Read the LOW or HIGH range, according to the range set with the FUNCTION switch.

g. Set the FUNCTION switch at OFF when the Model 652 is not in use, to conserve battery power.

3. Using the VOM Circuit while the Model 652 is Attached.

a. Set the 260 DIRECT – 652 ADAPTER switch of the Model 652 at its 260 DIRECT position.

b. Connect the VOM test leads to the COM. – and + jacks of the Model 652. These jacks are connected internally to the corresponding jacks of the VOM. Proceed with the standard operating instructions for the VOM, according to its Operator's Manual.

SECTION III

THEORY OF OPERATION

GENERAL

The Model 652 Temperature Tester consists of a battery powered bridge circuit, in which one arm of the bridge is a thermistor. A probe, containing the thermistor, is placed in the location where temperature is to be measured. As the temperature varies, the thermistor resistance varies and causes an unbalance of the bridge. The 50 microampere circuit of the VOM is connected to respond to the degree of unbalance in the bridge circuit and produce a meter reading. The slide rule is used to convert the VOM meter reading into a temperature reading.

A single dry cell flashlight battery is used to power the Model 652. The METER ADJUST control in the Model 652 changes the meter sensitivity to compensate for battery ageing. When the METER ADJUST control can no longer bring the VOM indication up to the 25 mark on the 0 to 50 scale, the battery must be replaced.

The two ranges for the Model 652 are obtained by changing the resistances in the bridge circuit. Resistance taps in the control portions of the bridge are connected through switch S2, which is the FUNCTION switch.

SECTION IV

MAINTENANCE

CASE REMOVAL

To remove the instrument from the case, remove the four screws located in the corners on the back of the case. All of the components are attached to the front panel.

PARTS REPLACEMENT

All of the components of the Model 652 have been engineered for many years of useful life. However, there are conditions under which parts may become damaged or faulty, and require replacement. Refer to the circuit diagram in figure 4 to help identify and locate any suspected part.

In the event of any component failure, order replacement parts from Simpson Electric Company or from any Authorized Warranty Repair or Parts Station. A list of these repair stations is included, beginning on page 19.

BATTERY REPLACEMENT

The dry cell battery should have a very long life with normal use because of the low current which is used. When the indication on the VOM cannot be brought up to 25 divisions on the 0–50 DC scale during the ADJUST procedure, replace the battery with a fresh size D dry cell. Be sure to observe polarity, and insert the new battery in the holder with its positive post contacting the spring clip marked +.

RECALIBRATION

The Model 652 is equipped with a calibration adjustment R11. If field calibration becomes necessary, the procedure is as follows:

1. Set the FUNCTION switch of the Model 652 at ADJ., and turn the METER ADJUST control for a reading of 25 on the 0 to 50 DC scale of the VOM.

2. Set the FUNCTION switch at LO, and set the PROBE SEL. switch at the position which matches the jack into which the probe is connected.

3. Place the probe in a glass of ice water consisting of at least 50 percent ice, and stir for 10 to 15 seconds to stabilize the temperature.

4. If the VOM reads 25 on the 0 to 50 DC scale (the same as for the ADJUST reading), no calibration is necessary. If the VOM does not read 25, proceed to steps 5 through 9.

5. Remove the 652 from its case (see Case Removal).

6. Turn the METER ADJUST control for a VOM reading of 25 on the 0–50 DC scale.

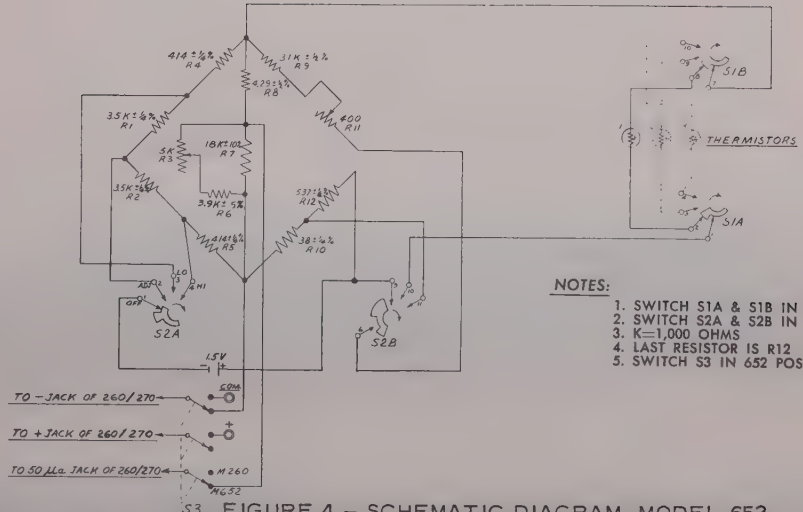
7. Set the FUNCTION switch at ADJ.

8. Adjust the screwdriver controlled rheostat, R11, located on the chassis, for a VOM reading of 25 on the 0–50 DC scale.

9. Set the FUNCTION switch to the LO position. The VOM should now read 25. If it does not, repeat steps 6 through 9.

PARTS LIST

Reference Symbol	Description	Simpson Part No.
R1	Resistor, 3500 ohms ±1/4%	10-675064
R2	Resistor, 3500 ohms ±1/4%	10-675064
R3	Potentiometer, 5K ±30%, linear taper	1-117329
R4	Resistor, 414 ohms ±1/4%	10-675065
.R5	Resistor, 414 ohms ±1/4%	10-675065
R6	Resistor, 3900 ohms ±10%	1-113045
R7	Resistor, 18K ±10%	1-113943
R8	Resistor, 4290 ohms ±1/2%	10-805079
R9	Resistor, 3100 ohms ±1/2%	10-805078
R10	Resistor, 38 ohms ±1/4%	10-675063
R11	Rheostat, 400 ohms ±10%	1-117656
R12	Resistor, 537 ohms ±1/4%	10-675062
S1	Switch, PROBE SEL.	1-118278
S2	Switch, FUNCTION	1-118279
S3	Switch, TPDT, 260–652	1-118102
	Slide Rule Scale	1-118301
	Slide Rule Screw	1-118142
	Slide Rule Hairline Indicator	1-118139
	Slide Rule Spring	1-118140
	Lead, 50 μAMP connection	3-810802
	Case, Adapter	10-860379
	Probe Assembly, 15-foot	10-890010



NOTES:

1. SWITCH S1A & S1B IN "1" THERMISTOR POSITION
2. SWITCH S2A & S2B IN OFF POSITION
3. K=1,000 OHMS
4. LAST RESISTOR IS R12
5. SWITCH S3 IN 652 POSITION

FIGURE 4 – SCHEMATIC DIAGRAM, MODEL 652 TEMPERATURE TESTER

SIMPSON WARRANTY REPAIR STATIONS AND PARTS DEPOTS

*California, Los Angeles ADams 2-4201
Quality Electric Company
3700 South Broadway
States: So. California below Fresno and Arizona

*California, San Francisco GArfield 1-7185
Pacific Electrical Instrument Lab.
111 Main Street
States: No. California above Fresno and Nevada

Canada
Bach-Simpson Ltd. GLadstone 1-9490
1255 Brydges Street
P.O. Box 484
London, Ontario, Canada

*Colorado, Denver RAce 2-8670
Meter-Master Instrument Service
2379 Downing Street
States: Wyoming, Utah, Colo. and New Mexico

*Georgia, Atlanta PLaza 3-4128
Electro-Tech Equipment
690 Murphy Avenue S. W.
States: Alabama, Georgia, Florida,
No. & So. Carolina, and Tenn.

*Parts Depots

*Illinois, Chicago COlumbus 1-1330
Pacific Indicator Company
5217 W. Madison Street
States: Chicago, Wisconsin and Indiana

*Louisiana, New Orleans TWinbrook 5-5621
Industrial Instrument Works
3328 Magazine Street
States: Arkansas, Mississippi and Louisiana

*Massachusetts, Cambridge UNiversity 4-2494
Alvin C. Mancib Company
363 Walden Street
States: Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island and Maine

*Michigan, Detroit LIncoln 7-1000
Ram Meter, Inc.
1100 Hilton Road, Ferndale
States: Michigan

*Minnesota, Minneapolis KEllogg 7-5411
Instrumentation Services
917 Plymouth Avenue
States: Minnesota, North and South Dakota

*Missouri, St. Louis FOrest 7-9799
Scherrer Instruments
5449 Delmar Blvd.
States: Illinois below Peoria, Iowa, Missouri, and Kansas

*Parts Depots

*New York, Buffalo EXport 2-2726
Electrical Instrument Labs.
1487 Hertal Avenue
States: New York State except Met. N. Y.

*New York 7, New York BArclay 7-4977
Simpson Instrument Service Corp.
27 Park Place
States: Metropolitan New York and New Jersey, above Trenton

New York, Syracuse HYatt 2-1651
Syracuse Instrument Lab.
2904 South Avenue

*Ohio, Cleveland CLearwater 1-4609
Weschler Electric Company
4250 W. 130th Street
States: Ohio and Kentucky

Oregon, Portland BElmont 4-6683
The Instrument Laboratory
1316 S. E. 7th Avenue

*Pennsylvania, Philadelphia ORchard 3-5600
Sunshine Scientific Instrument
1810 Grant Avenue
States: Penn. Md. New Jersey below Trenton, Virginia, W. Virginia, Washington, D.C., Delaware

*Parts Depots

*Texas, Dallas TAylor 4-2626
Nelson Electronic Eng. Co., Inc.
6329 Gaston Avenue
States: Oklahoma and Texas

Texas, Houston CA 8-2835
Nelson Electronic Eng. Co., Inc.
3615 Gulf Freeway

*Washington, Seattle ATwater 3-5850
The Instrument Laboratory, Inc.
934 Elliott Avenue West
States: Oregon, Washington, Idaho and Montana

*Parts Depots

WARRANTY

SIMPSON ELECTRIC COMPANY warrants each instrument and other articles of equipment manufactured by it to be free from defects in material and workmanship under normal use and service, its obligation under this warranty being limited to making good at its factory any instrument or other article of equipment which shall within 90 days after delivery of such instrument or other article of equipment to the original purchaser be returned intact to it, or to one of its authorized service stations, with transportation charges prepaid, and which its examination shall disclose to its satisfaction to have been thus defective; this warranty being expressly in lieu of all other warranties expressed or implied and of all other obligations or liabilities on its part, and SIMPSON ELECTRIC COMPANY neither assumes nor authorizes any other persons to assume for it any other liability in connection with the sale of its products.

This warranty shall not apply to any instrument or other article of equipment which shall have been repaired or altered outside the SIMPSON ELECTRIC COMPANY factory or authorized service stations, nor which has been subject to misuse, negligence or accident, incorrect wiring by others, or installation or use not in accord with instructions furnished by the manufacturer.

Quality is the indispensable component
of every Simpson instrument . . . . . .